

PROCEEDINGS OF THE ROYAL ENTOMOLOGICAL SOCIETY OF LONDON

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ORDINARY MEETING

WEDNESDAY, 5TH DECEMBER, 1951, at 5.0 p.m.

AGENDA

1. Confirmation of the Proceedings of the Ordinary Meeting held on 7th November, 1951.
2. Recommendations of candidates for Fellowship.
3. Announcement of election of new Fellows.
4. Additions to the Library. [See page 68.]
5. Nomination of Officers and Council for 1952.
6. Admission of Fellows.

Any Fellow who has not been formally admitted to the Society under Chapter XIV, Section 4 of the Bye-laws and attends the meeting on 5th December, 1951, is requested to inform the Secretary before 4.45 p.m. on that date.

7. JOINT MEETING WITH THE GEOLOGICAL SOCIETY.

Insect Distribution and the Hypothesis of Continental Drift.

Mr. E. B. Britton.—The most important problem presented by the present-day geographical distribution of insects is that of discontinuity. There is no universally accepted explanation of the fact that the distributions of many groups of insects are at variance with the present distribution of land. Some kind of link is necessary to account for these distributions. Such a link may be (1) accidental, due to transport across the ocean on floating debris, by wind, or on birds; (2) a continuous land connection. The importance of accidental transport is assessed by examination of the insect fauna of the Hawaiian Islands. Examples are given of discontinuous distribution of insects which could not possibly survive accidental transport. It is concluded that inter-continental land connections of some kind must have existed.

Three hypotheses compete in attempts to account for the necessary land connections:

(1) The classic trans-oceanic land bridges. There appears to be no geological evidence in favour of such bridges. The profound difference between the mean levels of continents (+ 2700 ft.) and ocean floors (— 12,450 ft.) and the reality of isostasy make it difficult to visualise any large-scale raising or sinking of land from or to oceanic depths. For these reasons major land bridges are now discredited among biologists,

(2) W. D. Matthew's hypothesis (1915, 1945) of radial distribution from the northern hemisphere requires relative permanence of the present distribution of land and sea. This theory suffices to explain the majority of distributions but fails to account satisfactorily for the insect fauna of New Zealand and associated islands.

(3) The theory of Continental Drift supplies a more elegant explanation of all the biological facts, and in particular accounts satisfactorily for the distribution of the more primitive insects. The main argument against Drift is that adequate forces cannot be suggested. It is pointed out that the provision of an explanation is not a necessary preliminary to the establishment of the fact.

Dr. H. E. Hinton.—1. So many factual and theoretical objections have been advanced against the possibility of land bridges connecting continents that are today separated by deep oceans that hardly any biogeographers now postulate the former existence of such bridges to account for the discontinuous distribution of animals and plants. Instead, biogeographers are forced to accept the broad outlines of the displacement theory or to believe that the facts of distribution are consistent with dispersals possible if the spatial relations of the continents were always what they are now. Once the possibility of transoceanic bridges is ruled out, it is clear that all of the great mass of evidence accumulated since the middle of last century for the existence of direct inter-continental connections is in fact evidence for the displacement theory.

2. Much of the argument advanced by entomologists and others in favour of the displacement theory is based on the discontinuous distribution of recent groups. It is therefore necessary carefully to examine the value of this kind of evidence, particularly as we have practically no fossil record of the former distribution of most insect groups below ordinal rank. To every argument based on the discontinuous distribution of a recent group of insects, the objection can be made that in former times the group may have existed in the intermediate regions. For instance, many groups of insects are confined to South America and Australia. This suggests a direct connection between the two continents but no more, since we do not know if these groups were more widely distributed in the past. What we do know, however, is that it is precisely the Australian and South American groups that tolerate only a very narrow range of environmental conditions, and apparently cannot be accidentally distributed, that are most alike. Here, then, is the kind of evidence that does not depend on unverifiable assumptions about former distribution.

3. Some of the best known arguments put forward by vertebrate palaeontologists against the displacement theory are briefly examined.

4. The origin of the Elmidae and Dryopidae of the American continents is discussed in the light of the displacement theory and its rival. It is believed that the beetles of these two families provide as good evidence as can be got from any recent group of insects for the relation of land and sea in the past.

Dr. G. M. Lees, F.R.S. (President, Geological Society of London).—The geological record shows that all visible portions of the earth's crust have been subjected to intense compressional forces acting throughout all time, from the dim eras long before the dawn of life to the present day. Some sectors have undergone successive phases of compression, others had already achieved rigidity before Cambrian times. The most satisfying explanation is the accommodation of a yielding crust to a shrinking core.

The continental drift hypothesis has the hypnotic fascination of an intriguing jig-saw puzzle. It offers a pseudo-explanation of the Permian ice age by assuming that continental rafts had remained moored tightly together till then; but if so, what process produced all the earlier great mountain systems, the Her-

cynian, the Caledonian and the several pre-Cambrian? The rafts were then split by a unique mechanism not operative in the Palaeozoic, and drift commenced through an imagined sima, each unit taking a different direction for some different reason. The forces produced by this supposed drift are quite inadequate to produce the mountain ranges of the Tertiary world by any reasonable geophysical analysis; geologically the consequences of assuming continental drift are, in my view, quite untenable.

The mobility of the earth's crust is unquestioned and there have been vast and continuous changes in the distribution of land and sea throughout geological time. Land connections between present continents are quite acceptable geologically but clues on their position and past history must be supplied from the evidence of the past distribution of faunas and floras. Geology can only point to the probability of great changes by a study of past processes. The compressional phase of an orogenic system is commonly followed by broad undulations of the zone as a whole, in some sectors upwards forming physical mountains, in others downwards to below sea-level. Raised beaches or plateaus many thousand feet above sea-level and drowned valleys many thousand feet below, submarine canyons, sea-mounts and many other physical features add testimony to the continuing change of land and sea.

Mr. R. J. Adie (Department of Mineralogy and Petrology, Cambridge).—The fundamental criteria for invoking the drift hypothesis include the distribution of pre-Cretaceous sediments and volcanics, structural and tectonic features, palaeogeography and palaeoclimatology; these topics are considered with special reference to Southern Africa, South America, the Falkland Islands and the Western Antarctic.

New methods of approach to this problem, including the study of residual magnetism in sediments and the distribution of erosion surfaces, are discussed. A new reconstruction of Gondwanaland is to be briefly mentioned.

TEA will be served in the Library before the meeting (from 4.30 p.m.).

NOTICE

Serial Publications in the Library of the Royal Entomological Society of London.

A list of the serial publications in the Society's Library, with the titles abbreviated in accordance with the *World List of Scientific Periodicals*, has now been prepared. Copies may be obtained in the Society's office, price (to Fellows) 3s. 9d.

PROCEEDINGS OF THE ORDINARY MEETING HELD ON 7TH NOVEMBER, 1951.

Mr. N. D. Riley, President, in the Chair.

Present, 80 Fellows and 19 Visitors.

The minutes of the Ordinary Meeting held on 3rd October were confirmed and signed by the President.

The names of the following candidates for election were read for the first time: Mr. R. F. Chapman, B.Sc., Mr. J. B. Free, Mr. Abdalla Habib, Mr. J. S. Hough, Mr. M. M. Megahed, Mr. D. A. Odd, F.Z.S., Mr. R. J. B. Power, B.Sc., Mr. H. B. Sargent and Mr. W. H. T. Tams.

For the second time (taken as read) : Mr. A. E. Brookes, Mr. A. M. Cunnington, Dr. Youssef Ezz Eddin Eassa, Ph.D., B.Sc., Mr. Abdel-Hamid Khalil, B.Sc., M.Sc., Mr. K. P. Lamb., M.Sc., Mr. W. O. Steel, Mr. L. Stimson, Dr. P. B. Stones, M.B., B.Sc., and Dr. Roger Warwick.

The Secretary announced that the following had been elected Honorary Fellows of the Society : Dr. D. J. Kuenen, Cobetstraat, 43, Leiden, The Netherlands ; Professor P.-P. Grassé, Faculté des Sciences de la Sorbonne, Paris.

The Secretary read the names of the following newly elected Ordinary Fellows of the Society : Mr. E. C. M. d'Assis-Fonseca, 18, Grange Park, Henleaze, Bristol ; Mr. M. Qutubuddin, Malaria Institute of Pakistan, Karachi cantt., Pakistan ; Mr. Kent H. Wilson, B.Sc., 823, East " B " Street, Moscow, Idaho, U.S.A.

The following papers, accepted for publication in the *Transactions*, were read in title :

" The wasp *Vespula sylvestris* Scopoli : feeding, foraging and colony development," by M. V. and A. D. Brian.

" New neotropical Derbidae (Homoptera : Fulgoroidea)," by R. G. Fennah.

" The Neoperlinae of the Ethiopian region (Plecoptera : Perlidae)," by H. B. N. Hynes.

" The morphology of the head of larval Hymenoptera, with special reference to the head of the Ichneumonoidea, including a classification of the final instar larvae of the Braconidae," by J. R. T. Short.

Mr. S. Beaufoy, Mr. L. Davies, Miss M. E. Godfrey, Mr. W. J. Gray, Mr. J. W. McHardy, Mr. E. R. Martin and Miss J. M. Thomas signed the Obligation Book and were admitted Fellows of the Society.

Thanks were voted to donors of gifts to the Library since the last meeting.

The Secretary read for the first time the following names of Fellows nominated by Council to serve as Officers and Council for 1952 : *President*.—Mr. N. D. Riley, F.Z.S. *Treasurer*.—Dr. N. E. Hickin, Ph.D. *Secretary*.—Mr. E. B. Britton, M.Sc. *Editor*.—Mr. J. Balfour-Browne, M.A.

Other Members of Council.—Miss T. Clay ; Mr. C. T. Gimingham, O.B.E., F.R.I.C. ; Mr. W. D. Hincks ; Lt.-Col. W. B. L. Manley ; Dr. G. D. Morison, B.Sc., Ph.D. ; Mr. H. Oldroyd, M.A. ; Mr. L. Parmenter ; Dr. C. Potter, B.Sc., Ph.D., D.Sc. ; Dr. O. W. Richards, M.A., D.Sc. ; Mr. A. Roebuck ; Dr. B. P. Uvarov, C.M.G., D.Sc., F.R.S. ; Professor G. C. Varley, M.A., Ph.D. ; Mr. Arthur Welti.

Alternative nominations supported by four properly qualified Fellows of the Society should reach the Secretary before the meeting to be held on 5th December.

Miss D. J. Jackson exhibited microscope slides, drawings, and dissections illustrating her investigations into the capacity for flight of water beetles. While many species are good fliers, having well-developed muscles of flight, a number of species, mostly of the DYTISCIDAE, appear, from the specimens so far examined, to be incapable of flight throughout their life. In such individuals the fibrous muscles of flight, if present, are extremely small and of abnormal histology, and modifications occur in the structure of the metatergum, the prephragma and postphragma which support the longitudinal muscles of flight being reduced, while the discs of the pleural flight muscles are small and weakly developed. Only these flightless specimens have been observed in certain species of the genera *Deronectes*, *Oreodytes*, *Hydroporus*, *Agabus* and *Platambus* and also in the

Hydrophilid, *Anacaena globulus* Payk. In other species the condition of the flight muscles is variable in different individuals, some being capable of flight while others are flightless. Of *Noterus capricornis* Herbst 50 specimens have been dissected from various localities extending from Middlesex to Fife, but only two specimens have been found with normal flight muscles and well-formed discs.

Brachypterous specimens of *Noterus clavicornis* Deg. were exhibited from a loch in Fife where over 50 specimens have been collected, all with abbreviated wings.

Mr. D. Leston exhibited: (1) *Sphaerocoris* Burm. and *Chiastosternum* Karsch; two Pentatomid genera with strigils in the male.

Various types of known stridulatory organs and strigils have been described in PENTATOMIDAE, REDUVIIDAE, CORIXIDAE, etc. A further type of strigil is present in two Ethiopian genera of Sphaerocorini (PENTATOMIDAE, Scutellerinae). It consists of a shelf-like projection of the male pygophore (8th segment) posteriorly with four or five rows of stout bristles on this shelf and placed immediately below the apex of the scutellum. In structure the organ is remarkably similar to the Corixid strigil and possibly analogous.

(2) *Aradus cinnamomeus* Panzer, an Aradid new to Britain.

This well-known bug has now been found to be established in at least three localities in North Surrey; it is possibly a vector of fungal diseases.

Dr. H. B. D. Kettlewell exhibited a musical instrument from Zululand consisting of a series of cocoons of LYMANTRIIDAE filled with pebbles and strung together on goatskin. The holes in the cocoons were normal and not due to a parasite.

Professor P. A. Buxton showed methods of studying types of Diptera which breed in fungi:

(1) It is convenient to maintain a stock of identified fungi which have been dried and exposed to a temperature of 50° C., which may be relied upon to kill any insects in them. When these fungi are soaked, they rapidly decompose and non-specific saprophagous Diptera may be reared on them.

(2) A strain of *Sciara* recently isolated from the fungus *Polyporus dryadeus*: an attempt is being made to rear the insect on a number of re-constituted fungi not related to one another. In a previous experiment, a species of *Sciara* originally raised from *Hypholoma fasciculare* had been sub-cultured successfully on the same fungus reconstituted, and on *Auricularia*, *Daedalea*, *Pleurotus* and *Psathyrella*.

(3) Larvae of an undetermined Cecidomyid living inside *Auricularia auricula-judae*, which grows commonly on elder (*Sambucus*).

Miss J. R. Groves exhibited male and female moths of *Adoxophyes orana* F.R. (Lep., Tortricidae), together with larvae and pupae bred at East Malling from larvae collected there. It had only recently been established as British and a map was shown of its distribution as far as it is known.

Mr. A. E. Gardner exhibited: (1) *Coenagrion armatum* (Charp.). Two male and one female imagines taken in Norfolk on 2nd June, 1951. One mature and one penultimate live nymphs bred from eggs obtained on the 2nd and 3rd June. These were deposited in the leaves of the frogbit, *Hydrocharis morusranae*, and hatched in twenty days. By the end of October all nymphs had reached the penultimate instar, and fifty per cent. were mature, having passed through eleven instars.

(2) *Leucorrhinia dubia* (Van der Lind.). One male and female imago obtained from south-west Surrey on 17th June, 1951. Three live mature nymphs dredged

from a Sphagnum bog in the same locality on 31st August, 1951. Breeding experiments have proved that in the southern range of this species the eggs hatch in from 18 to 26 days. The nymphs pass through twelve instars, two years elapsing from the time the eggs are deposited to the eclosion of the perfect instar.

The Rev. C. E. Tottenham exhibited specimens showing deformities in Coleoptera.

(1) Species showing abdominal deformities: *Harpalus rubripes* Duft., *Philonthus cognatus* Stéph., and *P. tenuicornis* Muls. and Rey.

(2) Species showing antennal deformities: *Bembidion illigeri* Net., *B. lunulatum* Fourcr., *B. litorale* Ol., *Feronia madida* Fabr., *Cafius xantholoma* Grav., *Malachius aeneus* Linn., *Cryptoccephalus moraei* Linn., *Phyllodecta laticollis* Suffr., *Galeruca tanacetii* Linn., *Podagrica fuscicornis* Linn., *Oedemera nobilis* Scop., *Cteniopis flavus* Scop., and *Cantharis nigricans* v. *discoideus* Stéph.

(3) Species showing leg deformities: *Notiophilus substriatus* Waterh., *Amara aenea* Deg., *Ischnopoda coerulea* Marsh., *Quedius mesomelinus* Marsh., *Adalia 10-punctata* Linn., *Chrysomela graminis* Linn., *C. staphylaea* Linn., *Galerucella sagittariae* Gyll. (?), *Donacia semicuprea* Panz., and *Malachius aeneus* Linn.

(4) Species showing deformities in both antenna and legs: *Gastroidea viridula* Deg.

In only one case have deformities been observed in both antenna and legs in any specimen. In addition, no deformities have been observed in more than one specimen of any species except in the case of *Malachius aeneus* Linn., of which three deformed specimens were found on the same occasion at Croydon (Cambs.). The specimens shown (together with a specimen of a Stag beetle with a triple leg, previously exhibited) represented the total deformities found in thirty years' collecting. Their occurrence might be estimated at considerably less than three specimens in every 10,000.

In all except one case the deformity was due to damage in the early stages, and it was noteworthy that deformity was extremely rare in the STAPHYLINIDAE.

Mr. H. Oldroyd exhibited two females of *Hinea jacoti* Bouvier (Diptera: TABANIDAE), lent for determination by the Musée du Congo Belge, Tervuren. This is a large red and black horsefly, of which only one other specimen is known. With it were shown a pair of the closely similar *H. bicolor* Austen, and examples of *Sphecodemyia lamborni* Austen and *S. secunda* Austen. The last three species are known only from specimens bred by Dr. Lamborn in Nyasaland, and have never been seen on the wing. The larvae are found in rot-holes in tree-trunks. The fact that such distinctive flies have not been taken on the wing in a well-collected area suggests an unusual habitat. They may be tree-top species that rarely come down to ground level, and perhaps may be crepuscular or nocturnal.

Mr. Oldroyd also showed a female of *Pangonia oldii* Austen in which the abdominal tergites were greatly distorted, although the sternites were normal.

Mr. E. A. J. Duffy showed specimens and drawings of the larva of *Agapanthia villosoviridescens* Deg. (Col., CERAMBYCIDAE), illustrating the recently discovered dorsal prolegs and extreme cephalic modification in the first-instar larva. He said that the first instar larva possesses unique modifications of the head capsule and dorsal ampullae. About twenty minutes after emergence a remarkable change takes place. The hypostoma becomes more and more convex, and a pair of teat-like hyaline processes become visible: these are gradually pushed away from the head by the prolongation of the basal tubercles from which they arise. These structures may be sensory organs, but their purpose is not yet evident.

The dorsal ampullae are also highly modified, having the appearance and function of prolegs which enable the larva to move rapidly on its back up and down the inside of the hollow thistle stem, thus leaving the fore part of the body free to reach across to the opposite side of the stem for feeding.

Mr. H. D. Swain exhibited a selection of British Lepidoptera taken in Putney. Most of the specimens were of two species, *Agrochola lychnidis* Schiff. and *Omphaloscelis lunosa* Haworth, and illustrated the very wide range of variation in these two species. Fourteen butterfly species were included in the 210 species of Lepidoptera taken.

Dr. B. M. Hobby reported that he had found two eggs of *Hamearis lucina* (L.) (Lep., RIODINIDAE) on the underside of a Primula leaf at Tubney, Berks., on 10th June, 1951. The larvae were reared together in a small glass-topped box and pupated at about the same time. A female butterfly emerged on 23rd August, 1951, but the other specimen seemed likely to remain in the pupal state over the winter. Both specimens were exhibited.

Dr. Hobby also exhibited living specimens of the rare tortoise beetle *Cassida fastuosa* (Schall.) taken at Wytham Wood, Berks., in early autumn. These were greenish when freshly emerged, but became yellow when more mature and had assumed the adult red coloration after some weeks in an incubator at a temperature of 25° C. The insects, including larvae and pupae, were found on the underside of the rosette leaves of young non-flowering plants of ploughman's spikenard (*Inula conyza* DC.). The rosette leaves, tightly pressed against the ground, protected the beetles from the sweeping net though their presence was easily detected by the characteristic holes eaten in the leaves.

Mr. R. B. Benson exhibited representatives of 6 species of sawflies recently discovered or rediscovered as British by Mr. Philip Harwood in the Spey Valley, Scotland: *Xyelatana piliserra* (Thomson); *Allantus basalis caledonicus* Benson; *Empria fletcheri* (Cameron) (including the previously unknown male); *Dolerus harwoodi* Benson; *D. coracinus* (Klug); and *Pristiphora carinata* (Hartig).

Mr. J. W. McHardy exhibited specimens of *Haltica ericeti* Allard (Col., CHRYSOMELIDAE) and its final instar larva. This species became so numerous on Kettleshills Moor, Berwickshire, in 1950 that 200 acres of young heather (*Calluna vulgaris*) were severely damaged. Searches on neighbouring and other moors revealed relatively few of the species. In autumn many of the pupae, which occur in the surface peat, were preyed upon by the larvae of an Anthomyine fly, which has not yet been described, but is known (provisionally) to the authorities of the Commonwealth Institute of Entomology as *Hylemyia (Delia)* sp. nov. 503. The male and female of this species were also shown, the female being unknown until bred out from this material. In 1951 the number of *H. ericeti* were still further reduced by the poor ovarian development, which resulted in the laying of very few eggs, and by the activities of predators. The reason for the failure of the ovaries to develop satisfactorily has so far not been elucidated. The larvae were distinguished from those of the Heather Beetle (*Lochmaea suturalis* Thomson), adults and larvae of which were shown for comparison.

Mr. Arthur Welti exhibited three forms of *Catocala fraxini* Linn. and Continental and English *Hyloicus pinastri* Linn., and also a box of NOCTUAE taken on and around the Chalk Downs.

Mr. Paul Freeman exhibited, on behalf of Dr. Llewellyn Lloyd and Mr. G. Crisp, some drawings of the larvae of two species of TIPULIDAE, *Phylidorea fulvonervosa* Schumm. and *Pilaria* sp., both belonging to the group of Hexatomini with carnivorous larvae. The later instars of these larvae have, posteriorly, a set of long hairs which hold air and enable the larva to breathe when submerged,

The hairs are not present in the first instar, but develop below the skin, so that shortly before the moult they appear within the terminal lobe coiled in a perfect circle. The same developmental mechanism seems to be followed in each subsequent larval moult as the hair circle has been seen below the skin in later instars also. It was suggested that this could be considered as a type of hypermetamorphosis.

The meeting concluded with a short film taken on the occasion of the IXth International Congress of Entomology, held at Amsterdam in August.

E. B. BRITTON, *Honorary Secretary*.

The next meeting (Annual Meeting) will be held on 16th January, 1952.

ADDITIONS TO THE LIBRARY.

Presented.

British Museum (Natural History). *Diptera of Patagonia and South Chile. Part III. MYCETOPHILIDAE*. By Paul Freeman. 8vo. London. 1951. [The Trustees of the British Museum.]

British Museum (Natural History). *A catalogue of the HESPERIIDAE indicating the classification and nomenclature adopted in the British Museum (Natural History)*. By W. H. Evans. 8vo. London. 1951. [The Trustees of the British Museum].

Descole, H., editor. *Descolei Genera et species animalium Argentinorum. Tomus II. Lepidoptera (Rhopalocera). Familia Hesperiidarum. Subfamilia Hesperinarum*. Exposuit Kenneth Ioannes Hayward. fol. Buenos Aires. 1950. [Instituto Miguel Lillo.]

Maynard, Elliott A. *A monograph of the Collembola or Springtail insects of New York State*. 8vo. Ithaca, N.Y. 1951. [The Publishers.]

Worthington-Stuart, Brian. *Collecting and breeding butterflies and moths*. 8vo. London. 1951. [Wayside and Woodland Series.] [The Publishers.]

Wray, David L. *Insects of North Carolina* [by C. S. Brimley]. *Second Supplement*. 8vo. Raleigh, N.C. 1950. [North Carolina Department of Agriculture.]

Purchased.

Goecke, Hans. *Monographie der Schilckäfer. II. Die fossilen Funde und ihre Bestimmung*. *Nova Acta Leop. Carol. (N.F.)*. 12: 339-380, 1943.

Peters, Hermann. *Bestimmungsübungen an einheimischen Insecten*. 8vo. Stuttgart. n.d.

Séguy, E. *Les Diptères de France, Belgique, Suisse*. 2 vols. 8vo. Paris. 1951. [Nouvel Atlas d'Entomologie.]

Shvanich, B. N. *Kurs obshei entomologii*. [General course in entomology.] 8vo. Moscow and Leningrad. 1949.

In addition, separates were presented by Commander Malcolm Cameron; United States Department of Agriculture; Dr. N. E. Hickin; Commonwealth Scientific and Industrial Research Organisation, Australia; Captain J. G. Brooks; Dr. C. G. M. de Worms; Mr. E. S. Gourlay; Dr. G. S. Hartley; Companhia de Diamantes de Angola; Dr. F. van Emden; Dr. V. B. Wigglesworth; Director of Infestation Control, Ministry of Agriculture and Fisheries; East Malling Research Station; Dr. Saadet Ergene; Commonwealth Institute of Entomology; and Mr. G. H. E. Hopkins.